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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/597,514	07/27/2006	Youhei Sakai	81872.0124	2199

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EXAMINER

MALEKZADEH, SEYED MASOUD

ART UNIT	PAPER NUMBER
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1791

NOTIFICATION DATE	DELIVERY MODE
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01/06/2010

ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No. 10/597,514	Applicant(s) SAKAI ET AL.	
	Examiner Seyed M. Malekzadeh	Art Unit 1791	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 23 October 2009.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 18,20,21,23-34 and 36-38 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 18,20-21,23-34 and 36-38 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 27 July 2009 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|-------------------------------------------------------------------------------------|-------------------------------------------------------------------|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Amendment

Claims **18, 20- 21, 23- 34, and 36- 38** stand **rejected**.

Claims **1- 17, 19, 22, and 35** are **cancelled**.

In view of the amendments, filed on 10/23/2009, following rejections are **withdrawn** from the previous office action for the reason of record

- Objection of claim 31
- Rejection of claims 18- 34 and 36 under 35 U.S.C. 112, second paragraph
- Rejection of claims 18- 23, 28- 34, and 35 under 35 U.S.C. 102(b) as being anticipated by Sakaguchi et al. (JP 10-182285)
- Rejection of claims 24- 27 under 35 U.S.C. 103(a) as being unpatentable over Sakaguchi et al. (JP 10-182285) in view of Lovejoy et al. (US 3,905,740)

New Grounds of Rejection

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject

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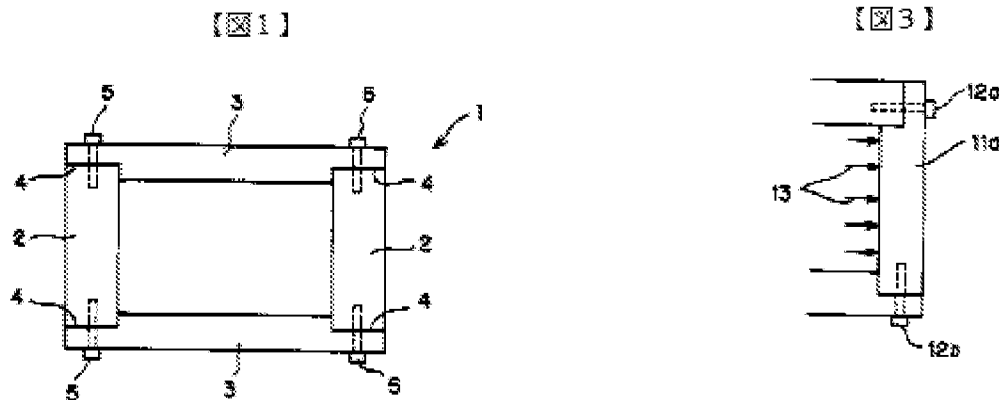
matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claims 18, 20- 21, 23- 34, and 36- 38 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sakaguchi et al (JP 10-182285) in view of Yamazaki et al. (US 6,136,091)

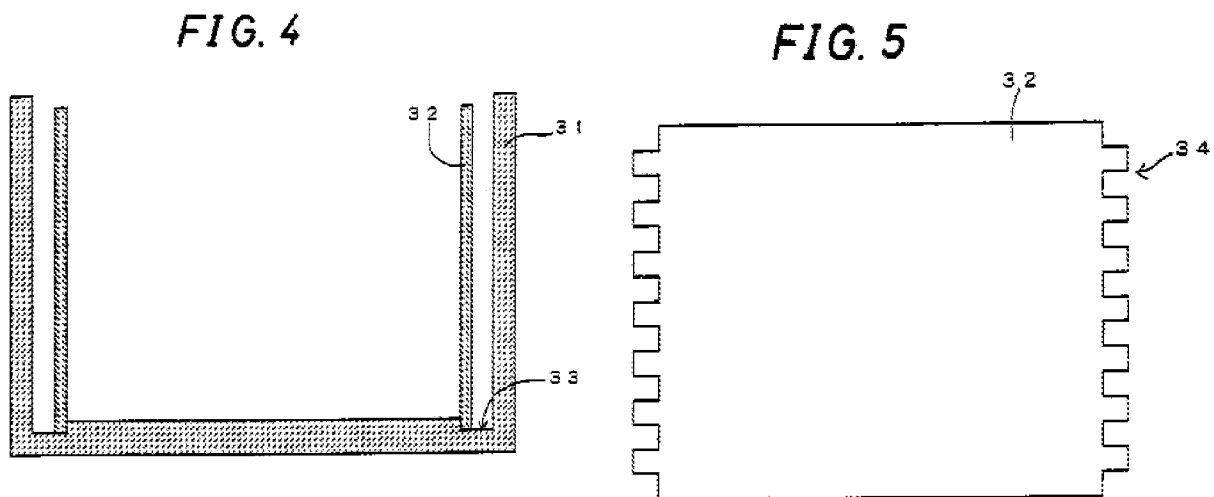
Sakaguchi et al (JP '285) teach a casting mold apparatus for solidification of silicon in which the mold apparatus comprises a bottom surface member, and two first side plates (2) and two second side plates (3), together, as a plurality of lateral surface members, L-shaped notches (4) formed at the both end faces of the side plates (2), inner flanks formed at the end faces of the side plates (3), and tightening bolts (5) in which the structure members (4 and 5), together, form an engaging structure, wherein the mold consists of four sidewalls (2 and 3) and a bottom plate, and fixed to each other by tightening bolts (5). (See abstract and figure 1)



Therefore, **as to claim 18**, Sakaguchi et al (JP '285) teaches a mold formed by combining a bottom surface member and a plurality of lateral surface members (2 and 3) abutted against the bottom surface member, wherein an engaging structure (4 and 5) for fixing the adjacent lateral surface members (2 and 3) to each other which is provided on a side of each of the lateral surface members, and each lateral surface member comprising a first engaging structure on a first lateral end (2) thereof and a second engaging structure on a second lateral end (3) thereof in which one of the first and second engaging structures of one of the plurality of lateral surface members (2 and 3) engages with one of the first and second engaging structures of another one of the plurality of lateral surface members.

However, Sakaguchi et al (JP '285) **fails to teach** each of the lateral members include a plurality of projections and recesses capable to be engaged to each other in such a way that the shape of the protrusions and recesses are in an asymmetrical relationship with reference to a center line of the lateral surface members.

In the analogous art, Yamazaki et al. (US '091) teach an apparatus for producing polycrystalline ingots in which the apparatus comprising a crucible (31) with four partitions (32) in which the partitions (32) are positioned laterally in a predetermined space (33) from the wall crucible (31) to form a parallelepipedal container, wherein each of the partitions (32) include projections (34) and recesses to be engaged with each other form a structure in which a shape of the protrusions and a shape of the recesses are in an asymmetrical relationship with reference to a center line of the lateral surface member. (See column 6, lines 58- 67 and column 7, lines 1- 10 and figures 4- 5)



Yamazaki et al. (US '091) further teach the projection and the recess are aligned along the lateral end of the lateral surface member and the projection and the recess of each of the first and second engaging structures are arranged in a lengthwise direction of the lateral surface member.

Therefore, **it would have been obvious** for one of ordinary skill in the art at the time of applicant's invention to modify the mold structure as taught by Sakaguchi et al (JP '285) through **providing** a plurality of projections and recesses for each of each of the lateral members that are capable of engaging with each other, in such a way, that the shape of the protrusions and recesses are in an asymmetrical relationship with reference to a center line of the lateral surface member **in order to** further improve a smooth and safe engagement between the lateral elements, as suggested by Yamazaki et al. (US '091)

Further, **as to claim 20**, Sakaguchi et al (JP '285) teaches the number of the plurality of lateral surface members combining with the bottom surface member is four.

Moreover, Sakaguchi et al (JP '285) teach that a width of the side plate (3) is 5 mm. (see paragraph 12); therefore, **as to claim 21**, Sakaguchi et al (JP '285) teach the engaging structure (4 and 5) comprises one or more engaging surfaces that are level with a bottom surface of the bottom surface of the bottom surface member, and a distance between an upper side of the lateral surface member and the engaging surface adjacent thereto is 5 cm.

Also, as to **claim 23**, Sakaguchi et al (JP '285) teach the engaging structures (4 and 5) are in a point-symmetrical relationship with each other and with respect to a center point of the lateral surface member (2 and 3). (See figure 1)

Moreover, as to **claim 28**, Sakaguchi et al (JP '285) teach a frame shaped member surrounds an outer periphery of the plurality of lateral surface members integrated by engaging with each other and is configured for constraining displacement of the plurality of lateral surface members, and as to **claim 29**, Sakaguchi et al (JP '285) teaches the frame-shaped member (4 and 5) surrounding an outer periphery of the plurality of lateral surface members (2 and 3) integrated by engaging with each other with play between the frame-shaped member and the plurality of lateral surface members, and further, a plurality of pressing jigs are arranged in clearances between the frame-shaped member (4 and 5) and outer corners formed by adjacent lateral surface members adjacent to each other, and configured for constraining displacement of the plurality of lateral surface members (2 and 3). (See paragraph [0010] and abstract) Also, **as to claim 30**, Sakaguchi et al (JP '285) teach one of the plurality of pressing jigs has two jig surfaces respectively contacting with outer peripheral surfaces of two of the plurality of lateral surface members, the outer peripheral surfaces form the outer corner of the mold.

Furthermore, **as to claim 31**, Sakaguchi et al (JP '285) teach the plurality of pressing jigs has a relief groove located corresponding to the outer corner of the mold so as not to directly contact with each other, and **as to claim 33**, the engaging structures comprises engaging surfaces that are level with the bottom surface of the bottom surface member and the frame-shaped members are arranged at positions of engaging surfaces.

Moreover, Sakaguchi et al (JP '285) teach applying silicon dioxide powder as coating layer to the inner surface of the side plate of the mold. (See paragraph [0004]) Therefore, **as to claim 34**, Sakaguchi et al (JP '285) teach a mold release material is applied to a mold inner surface comprising a bottom surface member and the lateral surface member (2 and 3) and locking sections formed by the bottom surface member and the lateral surface members (2 and 3).

Sakaguchi et al (JP '285) also teach the mold is used for manufacturing metal silicon coagulation and refining the semiconductor silicon ingot. (See paragraphs [0001] - [0002]) Therefore, **as to claim 36**, Sakaguchi et al (JP '285) teach a step of producing a silicon ingot using the mold and a step of obtaining a polycrystalline silicon substrate from the silicon ingot.

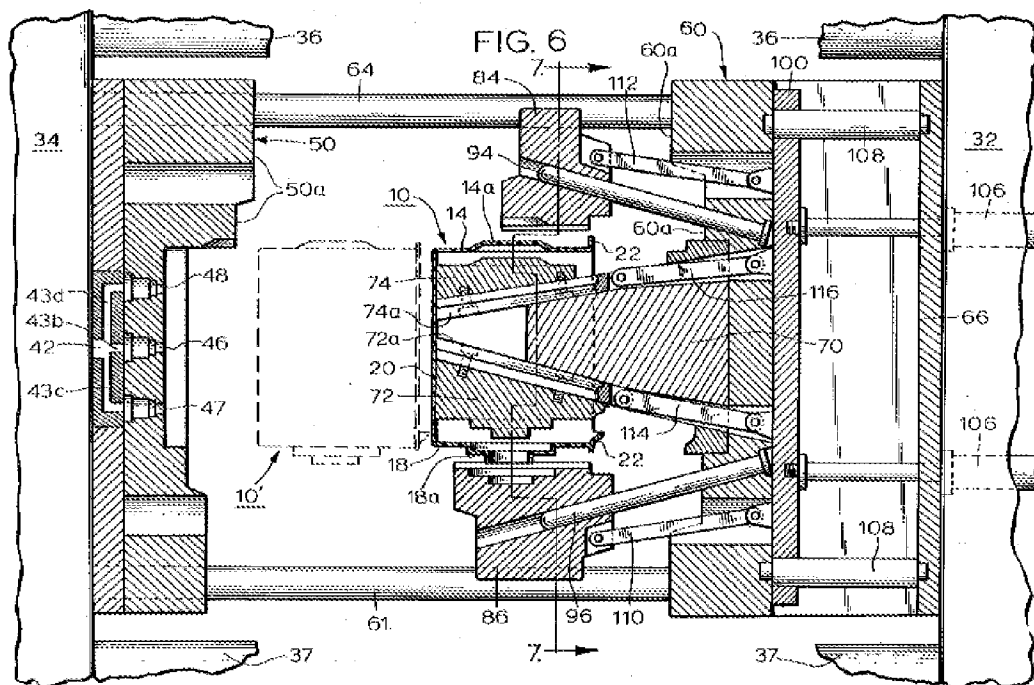
Claims 24- 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sakaguchi et al (JP '285) in view of Yamazaki et al. (US 6,136,091), as applied to claims 18, 20- 21, 23- 34, and 36- 38, and further in view of Lovejoy et al (US 3,905,740)

The combined teachings of Sakaguchi et al (JP '285) and Yamazaki et al. (US '091) teach all the structural limitations of a mold apparatus as discussed above in rejection of claims 18, 20- 21, 23- 34, and 36- 38. **However**, Sakaguchi et al (JP '285) **fail** to teach the apparatus includes a closed groove in the bottom surface center in which the bottom sides of the lateral surface

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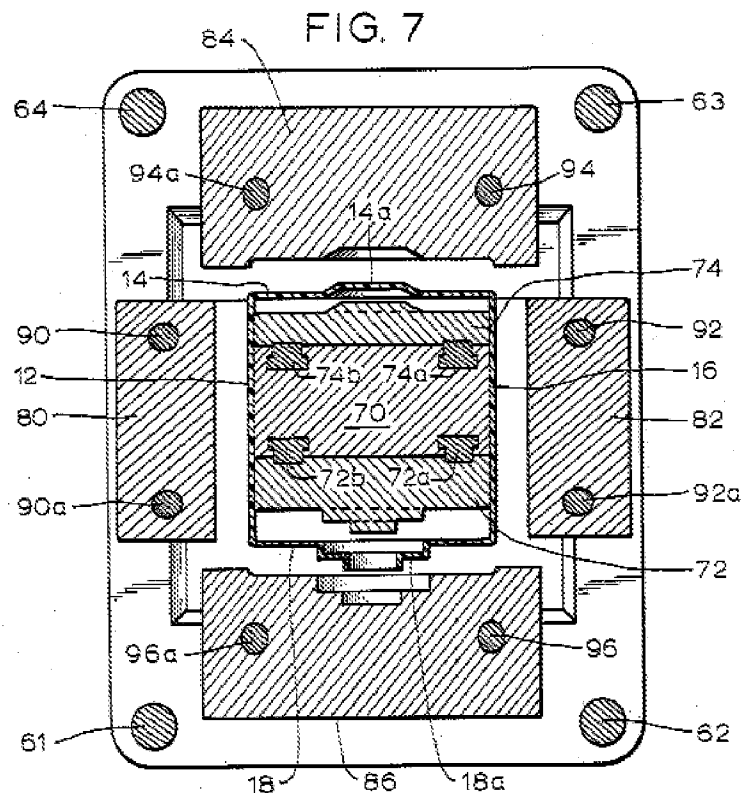
members are engaged with the groove of the bottom surface member and a plurality of wedge members are arranged in between the wedge receiver and outer peripheral surfaces of the plurality of lateral surface members engaged with the groove.

In the analogous art, Lovejoy et al ('740) teach an injection mold for making a polygonal plastic article having a closed bottom and an open top comprising a first mold section (50) as a first mold part fixedly secured to the stationary platen (34) and having a mold defining surface corresponding to the exterior dimensions of typical molded plastic article made, and a second mold section (60) as a second mold part which is fixedly secured to the movable platen (32) and is disposed in opposed facing relation to the first mold section (50). (See lines 31-36, column 3 and lines 61-67, column 3)



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Furthermore, the prior art teaches the mold (30) includes a sidewall mold means comprising four separable sidewall members (80, 82, 84, and 86). The sidewall members (80, 82, 84, and 86) are interposed between the first and second mold sections (50 and 60) and in the closed position of the mold (30) correspond with the first mold section (50) to define the exterior sidewall contour of the molded article (10). (See lines 36-51, column 4) Furthermore, the sidewall members are each supported and guided by respective pairs of guide rods (90, 92, 94, and 96) of a guide means structure in which each pair of guide rods are provided for each of the side wall members. (See lines 63-68, column 4 and lines 1-5, column 5)



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Moreover, Lovejoy et al ('740) teach the four sidewall members (80, 82, 84 and 86) are each formed as rectangular blocks and inter-fit in an overlapping relation. The sidewall elements in their closed position, collectively define the exterior sidewalls in the face contour of the mold cavity. (See lines 32-39, column 6 and figure 5) Also as shown, in an open position of the apparatus, the wall parts, together, provide a space volume which is greater than the volume of the wall parts in the closed position. (See figure 6 and lines 38-45, column 7)

Thus, Lovejoy et al ('740) teach the bottom surface member include a groove (60) and the bottom sides of the lateral surface members (80, 82, 84 and 86) are engaged with the groove (60) and the groove (60) surrounds the bottom surface of the lateral surface members (80, 82, 84 and 86) in combination and further a plurality of wedge members (72 and 74) are arranged in between outer peripheral surfaces of the lateral surface members (80, 82, 84 and 86) engaged with the groove (60) and the bottom surface outer periphery in which the lateral surface members (80, 82, 84 and 86) are abutted against a side surface of the bottom surface member and include a mold holder for placing a bottom surface member and the lateral surface members (80, 82, 84 and 86) in combination and a plurality of wedge receivers are arranged on an upper surface of the mold holder. Therefore, **Lovejoy et al ('740) teaches** the subject matter of **claims 24- 27**.

It would have been obvious for one of ordinary skill in the art at the time of applicant's invention to modify the combined teachings of Sakaguchi et al (JP '285) and Yamazaki et al. (US '091) through **providing** a closed groove in the bottom surface center in which the bottom sides of the lateral surface members are engaged with the groove of the bottom surface member and a plurality of wedge members which are arranged in between the wedge receiver and outer peripheral surfaces of the plurality of lateral surface members engaged with the groove **in order to** maximize the pressing between each of the lateral surface members providing a higher tightness between each of the lateral surface members, as suggested by Lovejoy et al ('740)

Response to Arguments

Applicant's **arguments** with respect to claims 18, 20- 34, and 36- 38 have been considered but are **moot** in view of the new ground(s) of rejection.

Applicant **argues** that "amended claim 18, distinguishes over Sakaguchi because Sakaguchi does not teach or suggest the limitations of the claim 18 requiring "each lateral surface member comprising a first engaging structure on a first lateral end thereof and a second engaging structure on a second lateral end thereof, wherein the first and second engaging structures each comprises a projection and a recess" (See remarks, page 8, third paragraph)

Applicant's arguments were fully considered but **was not found persuasive** because now in view of the above rejection, Yamazaki et al. (US

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'091) teaches each lateral surface member comprising a first engaging structure on a first lateral end thereof and a second engaging structure on a second lateral end thereof, wherein the first and second engaging structures each comprises a projection and a recess.

Furthermore, applicant's arguments in respect to the newly added limitations and previous grounds of the rejections have been fully considered but have not been found persuasive because now the secondary reference of Yamazaki et al. (US '091) has been applied in the above rejection which was not previously presented in the office action, mailed on 07/23/2009. The previously cited references of Sakaguchi et al. (JP 10-182285) and Lovejoy et al. (US 3,905,740) are still applied in the above rejections since these references properly teach the claimed subject matter.

Thus, the **rejections** of claims 18, 20- 21, 23- 34, and 36- 38 are **maintained**.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Seyed Masoud Malekzadeh whose telephone number is 571-272-6215. The examiner can normally be reached on Monday – Friday at 8:30 am – 5:00 pm.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Steven P. Griffin, can be reached on (571) 272-1189. The fax number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published application may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Steven P. Griffin/

Supervisory Patent Examiner, Art Unit 1791